

\$ SSOEDMRQ RI Z DMVZ DMUUF FQJ LQ WHDMV HQW SURFHVHV

0 DMV =KURY 6MQLDY\$ GNMHY

0 R V F R V B W I H Y H R J W L V Q Q L Q H H U D Q J R V O D Y K R N R A M F R Z 5 X V V L D

\$ E V W U T K F R V E M R H W W H V X L O V K P H W I R E G V W H U Z I D F A F O L Q J
 7 K H S U R E Q H U P H G X W L K Q H J D W R S Y B F O W K H Q Y L U R Q P H Q W
 L Q F U H V D K H I Q F L F R Q W U H D V D F H Q L W W K E H R V X W H Q W W K H
 P R P H Q K V P H W K R G F R I Z D R V W H Z E F A H F O V R Q H I W K P R V W
 I D P R D Q G R S X Q B Z D G D D V W H Z I D W F F U D O Q E B W K R
 U H G X F K Q H J D W E S B F F O W K H Q Y L U R Q Q V F U M D X V H
 H I L F L H R Q F Y L V W L H F J K Q R O F R K H P E D D V W H Z D W M B W P H Q W
 (I D P S O R H W K L P S O H P H Q W W K M V R Q R Y G P H D S W R F H V V L Q J
 L Q G X D V W O D Q Q W H S S J U R L G H F M V Q J D S F K R V R S Q R D Q G
 P L Q H I U H D O V L D Z J H I D O V K L P S D R F O W K H S H U D R V E I L R Q R J L F D O
 I L O D F F R Q V L G O V L F H G X B W H K V X G K X U V H Q W I D W K R Q
 Z R U R Q K L P S O H P H R W K P M W K R G R O C M H F W L Z I D Q H V V
 F R Q V L G X I W W E R I V K D F D Q S B G R L P H D W L H F D O K L W X H
 Z H U F R Q V L G H K U H I D U L D I Q F S O H P H Q W W K V H R Q U F X O D W L R Q
 P H W K R Q K H J L V W I H Q J K Q R O F R K H F P D O V W H Z D W B R V I P H Q W
 W D Q S H U R G X Z D V F R Q V L G S H W H K B Q B I W K V W X L Q Z D V
 F R Q F O X K D W Q P S R U M R Q W L Q H U V W K M B F K H Q R D W M
 V X F F H I V Q W X Q I U O M V R R Z D Q W H Z D W B S U P R F Q H K V P H V
 . H \ Z R U G M V Z D M U U F F Q J F O P D M L G X W I D O H I O H Q W
 W Q Q U J U H Q K R X H J D H V

, Q W U R G X F W L R Q

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 FRQHYDNRQ : DMU LV DQ LP SRUODFHDP HQWRI KXP DQ QIH , WLV XHG LQ DOWSKHUH RI
 KXP DQ DFMYLW KRXVKRQ LGXWDD DJUFXODD HIF : DMU LV XHG IRU FRRNLOJ DGG
 FXQYDNRQ RI DJUFXODD SURGFW IRUP DQ DFMYLQJ RI LGXWDDOV FVUP DMUDY DGG
 FRRQJ RI WFKRQJ LFDOSURFHVHV LQ WLUJ DNRQ SURFHVHV DGG SURGFWNRQ RI QJWVGGXW
 P DMUDY Z DMU WHDMV HQW SURFHVHV IRU XUDDQ UHMGQW DGG VHMOP HQW (YHU \ HDUWH
 YRQPHRI Z DMU XHG LQFUHDH VJQILFDQ \$ FFRUGQ VR D 8 1 UHFRV @MH KDYHEHQ
 LQFUHDQJ E\ DERXW HYHY \ HDUJUMH DWRXUGFDGHV 7KLVLVGHVRI DFMYLWFK DV
 SRSXDNRQ LQFUHDH DGG VFLR HFRQPLF GHYBSP HQW \$ V WH FRQXP SNRQ RI Z DMU
 LQFUHDH VHSUHQW HRI Z DMU SROQRQ E\ WH HIOHQW W D U H J H Q D M G D W U L W X H

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DOR LCFUDH V \$ FFRUGQ VR VHGDM IRU > @Z DVNZ DMU LV GLVWEXANG E VFRU V DV
 IRCPZ V KRXLQJ DGG FRP PXCDD DJUFXOMUDO LGGXWIDD RAKHU
 Z DVNZ DMU %H RUH GLVKDJH LQR Z DMJERGHV DQZ DVNZ DMU P XWVH WHDNGVR VVH
 P Q LP XP SHU LVMEQ FRCP QANDRQ RI KDU I XOVXEWDFH V 0 3& > @: DVNZ DMU IURP
 VVH LGGXWIDD VFRU > @ VQCHUV P HVDQJLEDD SXG DGG SDSHU SDQV RLO LGGXWV
 HQMSULHV > @ DUHP RQJ VVH P RVASROWG LQ WLP VRI VVHFRQMQVRI KDU I XOVXEWDFH V
 7KLVLV GYHVR VVHFRP SDJ LWR RI VVH VVFKRBJLEDD
 SURFH V > @Z KFK UHTXUV P RUHDGGP RUHZ DMUHYV \ HDJ > @7RUHGXFH VVHXVRI Z DMU
 E LGGXWIDD HQMSULHV DGG FRQHTXHQD VR UHGXFH VVH I RUP DNRQ RI Z DVNZ DMU VVH
 VVFKRBJ RI UFA FQJ RUUVVRI Z DVNZ DMU > @VXVGDORYH VVHZ RUG) RUH DP SDJ
 VVHFLV RI ' XUEDQ > @Z KFK LV VVH VVGLG DJH VVWLV LQ 6RXX \$ IUFDD KDV EHQWHDMDQJ DGG
 UHMLQJ Z DVNZ DMU HTXLYDDQ VV 2 OP SLF VJ HG VZ LP P LQJ SRQVHYV GD VQFH
 IRUVVH QJW DGG UH LQJ LGGXWVH : DVNZ DMU UFA FQJ FRP ELG GZ LK UHVXVUHGXFH VVH
 QJ DMYH LP SDFWRQ VVH FOP DM QP HD JUHQKRXV JDV HP LVLRQV , Q DGGWRQ VV
 DSSURDFK LV DOR FRVHI H VVYH DV LI FLVHV LQ HP HJLQJ HFRCP LHV IRFXV RQ Z DVNZ DMU
 UFA FQJ DVWU VVH FULV LQ LVFRXG P RELOH XS VR VVLRQJ LQ LQV VVH FQV DGG
 FUDMP RUHVDDQ P LORQ VVEVE 7KLVLV RUP DNRQ GP RQVMDM VVHI H VVYH QHW
 RI VVLDSSURDFK ERV RQ VVH VVGH RI UHGXLQJ QJ DMYH LP SDFWRQ VVH VVXURQGGQJ FOP DM
 DGG LQ WLP VRI VVE FUDMRQ 7KLVLV UHV DJK SDSHU Z LQDQ DP LQH ERK H LVMDQ P HMRG VRI
 Z DVNZ DMU UFA FQJ DGG VVH RSNRQ RI LQMDMDQ UFA FQJ LQR DQ H LVMDQ VQCHV
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 VVHGLVFXV G VVFKRBJ LQR VVH VVH LVMDQ VVFKRBJLEDD VVH P HV DVZ HD

0 H W K R G V

, Q VVHFRXVRI VVH VVXG VVH P HMRG VRI LP SOP HQVMDRQ RI Z DVNZ DMU UFA FQJ P HMRG V
 DVP HDV SURFHMLQJ LGGXWV HQMSULHV HQMSULHV IRU VVH SURGFWRQ RI H VVDFVYH
 SKR SKRUF DFG DGG P LQDQ H VMDQ HV DVZ HDQ DVVRI LQVZ H VVFRQLGHU G 7KH YDUDQV
 RI Z DVNZ DMU UFA FQJ P HMRG DSSODMRQ DGG VVH LQ QXCFH RQ VVH SURFHVH VRI
 VVFKRBJLEDD VVH P HV XCFWRQJQJ DUHFRQLGHU G
 2 E VVFRV VVXG Z DVNZ DMU VVH VVHQV
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 H DP LQH VVH H LVMDQ DGGP RVVSRP LVQJ DSSODMRQ VRI VVH UFA FQJ P HMRG
 7KH FRQVLRQ LV P DGH DERXV VVHI H VVYH QHW RI VVHZ DVNZ DMU UFA FQJ P HMRG DGG VVH
 SRVLEQW RI LVVLFQVLRQ LQ VVH H LVMDQ VVFKRBJLEDD VVH P HV

5 H V X O W V

\$ SSOEDMRQ RI Z DVNZ DMU UFLUXDMRQ DVVLRBJLEDD VVH VVHQV SDQV > @7KH SRVLEQW
 RI DSSODMRQ RI VVLP HMRG FQDEHFRQVLRQ GE VVH I RCPZ LQJ FRQVLRQV QZ GHUHH
 RI Z DVNZ DMU VVH VVHQV KJK GHUHH RI SROWRQ FRQMQV LQ LQFP LQJ Z DVNZ DMU
 VVQSRUVRI UHMLQ D VVYDNG VQGH Z K Q X V G LQ VVFKRBJLEDD VVH P HV RI DHUDMRQ VQV
 , QVRGFWRQ RI VVLP HMRG LQR VVH H LVMDQ VVFKRBJLEDD VVH P HV KDV DQ LP SDFWRQV
 RQ
 VVH H I LQCF RI Z DVNZ DMU VVH VVHQV VVXVDDOR RQ DQDQJ HQV RI VVH V VVW 6R DV
 LCFUDH RU YLFH YHVD LQVRGFWRQ RI Z DVNZ DMU UFLUXDMRQ LQ EIRBJLEDD VVH VVHQV
 I DQVH VVH LV DQ LCFUDH LQ SURVXUH RQ VVH P KI GLDQCF QDQ 7KLVLV YDQX GLVFDQ
 G H QG RQ VVH UFLUXDMRQ VMDQ DGG QDQ VVDFKDJH LQ VVH GLVMDRQ RI VVH RI Z DVNZ DMU
 LQ VVH EIRLQV QDQJQ DVZ HDQ VV DE VVH VVGLVWEXNRQ RI I QZ LQJ RQ VVH VVDFH RI VVH

(0000) H10XQV% LQURGFLOJ UHFLUXDNRQ LQ V VAP V WADVLCFOXGH DHUDNRQ WQNV VNH
 SRWELQW RI LCFUHDLOJ VNH VOXGJH GRVH DQG LP SURYLOJ VNH HILFLHQA RI Z DVNZ DMU
 WHDV HQV/DFKLYHG + RZ HYU DVVNH VOP H V P H V H U H L V D U H G F W R Q R I V O X G J H U H L G Q F H
 V P H I Q V H V O X G J H V F S O U D M U / Z K L F K L V F D X V H G E V N H L C F U H D L O J K I G U D X O F 0 0 0 8 0 1 P D M D
 V M V F D Q 0 0 0 V R L C F U H D H G V O X G J H U P R Y D O 0 0 0 G D V J Q I L F D Q V G F U H D H I Q V H Z R U N L O J V O X G J H
 G R V H I Q V H H D H D N R Q W Q N % D V H G R Q V H U H X O V R I V M V V M G > @ V H I R 0 0 Z L O J F R C F O X M R Q
 F D Q E H P D G H V H D S S O F D N R Q R I Z D V N Z D M U J H F O Q J W F K R O B J \ F D Q L G G H G I P S U R Y H V H
 H I L F L H Q A R I Z D V N Z D M U W H D V H Q V E X W R D F K L Y H V M V U H X O V D F R P S U H K Q L Y H F K O J H R I
 V H H Q M V H V W A P L V U H T X L U H G

\$ S S O F D N R Q R I Z D V N Z D M U U H F F O Q J W F K R O B J \ L Q V H P H D V S U R F H W L O J L G G W M 7 K H
 F R P S R V M R Q R I Z D V N Z D M U L V K J K O F R C F Q A N D M G D O G F R O M L Q / V H I R 0 0 Z L O J F R P S R C H Q W
 > @ D O U J H D P R X Q V R I V X S H G G V R O G / J G P U S U H F O M G E R U J D Q F
 I P S X U M V H D O G V R O G L Q R O X E C H V X E W D C F H V K J K % 2 ' Y D O X H V J G P D F L W R I
 Z D V N Z D M U Y D U H V I U R P Y H U D F L G F Z L W S + V R Y H U D O D O C H Z L W S + , Q R L G U V R
 I P S U R Y H V H H I L F L H Q A R I Z D V N Z D M U W H D V H Q V W H I R 0 0 Z L O J S U R F H W V F K P H I V S U R S R V H G
 Z K L F K L C F O X G H V W H I R 0 0 Z L O J V M S V W H D V H Q V R I F R O U H G L S H U H I P S X U M V H D O G I X U M H U
 G L X Q H F W R Q R I H I O X Q V G O X M R Q R I K J K O F R C F Q A N D M G H I O X Q V Z L V S U M L R X O W H D M G
 R Q V F R P S O M U P R Y D O R I L Q R O X E C H V G I P H Q W , Q V M V / F D H Z D V N Z D M U J H F O Q J K H S V
 V R D F K L Y H V H S U R G F W R Q R I V H Q F H W O J L C G F D M U / H M D E O K H G E V H U H T X L U P H Q W R I
 6 D O B L 1 > @ D O G U H G F H V H Q H J D M Y H I P S D F W R Q V H H Q M L U R C P H Q V E G O X M Q K J K O
 F R C F Q A N D M G Z D V N Z D M U Z L V S U M L R X O W H D M G Z D V N Z D M U

\$ S S O F D N R Q R I U H F F O Q J W F K R O B J \ D V H Q M S U L H / S U R G F L O J H W D F M Y H S K R S K R U I F D F L G
 D O G P I C H U D C H W M D H V / > @ : D V N Z D M U / R I V M V S U R G F W R Q E H O J V R V H F O W R I K Q D L G
 D O G F R O M L Q V H I R 0 0 Z L O J F R P S R C H Q W I O R U I C H) L Q V H D P R X Q V R I J G P
 S K R S K R U V R I L G H 3 2 L Q V H D P R X Q V R I J G P V X S H G G V R O G / L Q V H D P R X Q V
 I U R P V R J G P 7 R U H G X F H V H Q H J D M Y H I P S D F W R Q V H H Q M L U R C P H Q V W H I L Q U R G F W R Q
 R I Z D V N Z D M U J H F O Q J W F K R O B J \ L V S U R S R V H G U H M Q R I S O V R I V H V O X G J H V R V H K H D G R I
 V H S U R F H W Z K L F K F R O M E X M V R L C F U H D L O J V H U D M R I F U W D O J D M R Q U H D F W R Q R I
 S K R S K R U V D O G I O R U I C H F R P S R X Q G / D V Z H O D V U H G X F L O J V H L U F R C F Q A N D M R Q L Q V H W H D M G
 H I O X Q V R I V H 0 M H O H M D E O K H G E V H U H T X L U P H Q W R I 6 D O B L 1 > @ 7 R S U R Y H V H
 H I H W Y H Q H V R I V M V U H F L U X D M R Q P H M R G D Q H S H U I P H Q V @ Z D V F R O G F W M R Q I R X U P R G O
 V R O X M R Q / W D W M P X O M G D F L G F Z D V N Z D M U D O G V O X G J H S U R G F H G L Q V H S U R F H W R I L W
 Q X M D O J D M R Q ' L W M D G Z D M U Z D V X H G I R U V H L U S U S O U D M R Q L Q V H H S H U I P H Q V V H
 F R P S R V M R Q R I Z K L F K Z D V D G X W M G E V D G G L O J S K R S K R U I F D O G V L O F F R I O R U I F K I G U R J H Q D F L G /
 V R D F K L Y H I O R U I C H D O G S K R S K D M F R C F Q A N D M R Q / L Q V H P 7 K H I L W V R O X M R Q F R U J H S R C G G
 V R V H I O R U I C H H I O X Q V S U R G F H G E V D E V L S M R Q 7 K H V F R O G V R O X M R Q F R U J H S R C G G V R V H
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 V M L L G V R O X M R Q F R U J H S R C G G V R V H V R O X M R Q D V H U Y D S R U D M R Q R I D F L G F H I O X Q V / F R P L O J V R V H
 Q X M D O J D M R Q W D M R Q 6 R O X M R Q F R U J H S R C G G V R D Z H N V R O X M R Q R I S K R S K R U I F D F L G
 Z W 3 2 D O G D F M G D V D F R P S O U M R Q V R O X M R Q 7 K H F K O U F M U M V V R I V H V R O X M R Q / D U H
 J L Y H Q L Q 7 D E C H

Table 1 & K D U D F V R H H U S M W L R R Q W V D R Q V

, QG F D R U Q P H	0 R G H Q J 6 R O W R Q			& Q U I L G Z D M U D V M U H Q E R U D A R U W L F N Q U
S+		±	±	
K) J GP				
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K V G V E W D Q F H V J GP				

\$ V D U H X O V R I V M H H S H U P H Q V > @ L V Z D V I R X C G W D W M H R U J D Q J D M R Q R I V M H F O R V G
 V K P H R I Z D M Z D M U W H D F H Q V Z L V K U H F L U X O M R Q Z L V K V M H P X O S O F L W I D F A U R I V O G J H
 F L U X O M R Q

. p F R O M E X M G V R V M H U H G F W R Q R I V M H P D Q F R O M R O G L Q G F D A U V S K R V S K D M / D G G
 I O R U I G H V D G G S U R Y L G H G V M H G K W D Q J D M R Q S U R F W D A Q Z H U S + Y D O X H V Z K L F K S U R Y L G H V D
 Q Z H U F R Q X P S M R Q R I Q H W D Q J L Q J D I H Q V

\$ V D U H X O V R I V M H D O D O V L R I H L M W Q V V M P V R I Z D M Z D M U H F O Q J E R M L Q H L M W Q
 V V M P V D G G L Q Q E R U D A R U F R O G W R Q / Z H S U R S R V M H R U J D Q J D M R Q R I U H F O Q J D V D W O Q H V
 Q F D I N G L Q V M H W M U R U R I V M H 5 X W D Q) H G H D M R Q) X U M H U Z H Z L O F R O L G H V M H H L M W Q
 V M K R Q R U L F D O V K P H R I Z D M Z D M U W H D F H Q V R I W O Q H V S U R G F W R Q % H R U H V M H S U R G F W R Q
 Z D M Z D M U I R U W H D F H Q V L W K D V M H I R O Q Z L Q J L Q G F D A U V S + V X S H Q G G V R O G /
 P J G P V M O F K U R P L X P F R O M Q V P J G P & K U R P L X P P J G P
 & K U R P L X P P J G P & 2 ' P J G P \$ V M H E H J L Q Q J R I V M H W H D F H Q V
 S U R F W Z D M Z D M U H Q M V P H K Q Q F D O W H D F H Q V R U P R Y H V X S H Q G G V R O G / F R O M Q G L Q
 V M H H I O X H Q V 6 X E V T X H Q W V M H Z D M Z D M U H Q M V V M H K R U J R O D O V M W Q V D Q W I R U I L Q H
 P H K Q Q F D O W H D F H Q V 7 K X V V M H L Q G F D A U V I R U E L R O J L F D O W H D F H Q V D U H D F K H Y H G V M H
 F R O M Q A R I V X S H Q G G V R O G / L Q V M H U D Q J H I U R P V R P J G P S + L Q V M H U D Q J H I U R P
 V R 1 L M W L F D M R Q D G G G H Q M W L F D M R Q D U H F D W I I G R X W 7 K H I L Q D O M W H R I V M H H L M W Q
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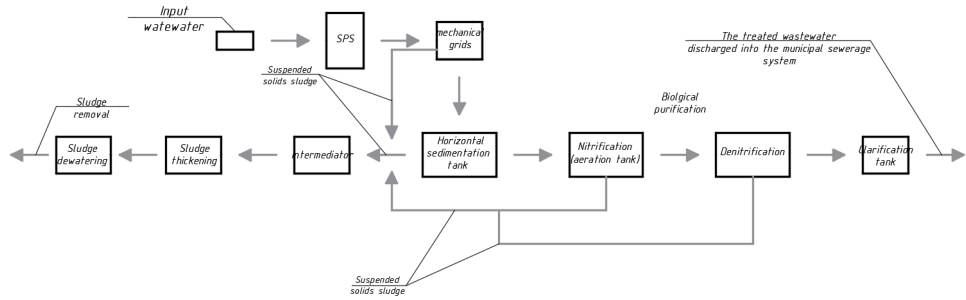


Fig. 1. ([L V WWLQFK Q RVCFKJBEHD O W HVZ D WDW P H Q W

%DVG RQ VH FRQLGHUG VHRUHFDDP DMUDD LMLV VSSRVHG VR LGFOGH LQ VH H LMLVQ
 WFKCRJLDD VFKPH RI ZDVNZ DMU UFA FQQ WFKCRJ\ VR LP SURYH VH ERJLDD
 WHD\ HQV SURFW 5 HFLFXDNRQ RI HIOHQVDVU QVLLFDNRQ DGG GQVLLFDNRQ LV
 SURSRVG Z KFK ZLOLP SURYHERM VHHILHQA RI ERJLDDWHD\ HQV DGGVHHILHQA
 RI VH WFKCRJLDDVFKPH DV D ZKROI + RZHYU EDVG RQ VH FRQLGHUG VHRUHFDD
 PDMUDD VH LQURGFNRQ RI ZDVNZ DMU UFLFXDNRQ DGGV VR D FRP SDIM FDDJH LQ VH
 WFKCRJLDDVFKPH RI WHD\ HQV DV VH KI GUXDE DGG RQ VH ERJLDDWHD\ HQV
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 JHP HMF GP HQMRQV , QRGHVVRVVM VLVGHVLRQLVZ LQEHGFHWVJ VR VVVMHLP SDFW
 RI VHUFLFXDNRQP HMRGRQDQERUDV LQVXDNQR

)LXUH VRZV VH SURSRVG VFKPH RI ZDVNZ DMU WHD\ HQVZ LVK DFLVYDNG VOGJH
 UFLFXDNRQURP VHVFRGDU VGLP HQMRQVQDN Z KFK VHYHVDVDFQVLLFDNRQVQDN

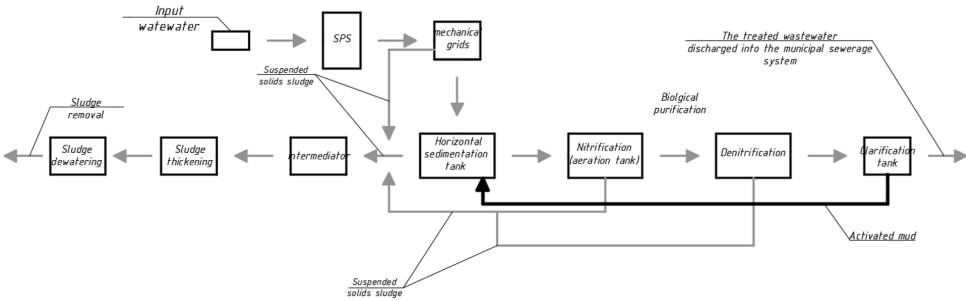


Fig. 2. \$ V V X VWHG K Q RVCFKJBEHD O W HVZ D WDW P H Q W

& R Q F O X V L R Q V

,Q VH FRXUH RI VLV ZRUN ZHKDYH DDDJHG VHP HMRGRJ\ RI ZDVNZ DMU UFA FQQ
 DSSDFNRQ Z KFK LV LP SDP HQMG LQ YDURV I LQV ERM LQ VHP HDV SURFWLQJ LQGVM
 DGG LQ VH SURGFNRQ RI H VDFVH SKR SKRUF DFLG DGG P LQJDDI HVMQ HVJ %DVG RQ VH
 DDDJHG VRXUH Z HFDQFRFOGHVDMV WFKCRJ\ LVZ LGHD VSHDGLQRXUFRXQV DGG
 DEURD DGG LVDFVH XHGLQDQGLQVHLV IURP QKVRKHDA 7KHFRQLGHUGVFKCRJ\
 UFDQ DQZ VUHGFLQ VHQJDDVHLP SDFVRVHQVYLRQ HQV DGG LQFUDLQ VHHILHQA
 RI VH

WFKQRJLFDVFK-P H RI Z DVNZ DMU WFDV H QV D Z KRDI + RZ HYU WH LQFOXVLRQ RI WLV
WFKQITXH UHTXUW D QJH DGG VHIRXV DGDV LV Z KLFK Z LQDFV D IMXWLFDMRQ IRUWH
QHFWLV DGG SRWELQW RI LV LP SGP HQMVRQ DV LVHQV D FRP SGM UHVLVRQ RI WH
WFKQRJLFDVFK-P H

7KH P DQ FRCFOXVLRQ RI WLV UHFDVK SDSHU LV WDMWH SUREOP RI LP SURYLOJ WH
HILFHQ RI Z DVNZ DMU WFDV H QV D WH LGGXWIDV FVU LV YHU LP SRUQV DGG UHTXUW
DMRQ) XUMHU UHFDVK LQV WH LQFOXVLRQ RI UFA FOQJ WFKQRJLQ WH H LVWQ
WFKQRJLFDVFK-P H VZ LQJGXFWHQJ DMYHLP SDFVRQ WH HQYLRQV HQV

5 H I H U H Q F H V

81 UFSRVZ DMU FULV FQRCO EHYUFRP HVUJHMHU

[KWSV QZVXQRJ UXVRU](#)

%X LQ, 0 RGHQV HMRG/RI Z DVNZ DMU WFDV H QV . GRZ OGJHEDV 0 68 / \$ %
7HVWQJ & HQH : DMU 0 RGHQV P HMRG/ RI Z DVNZ DMU WFDV H QV

[KWSV ZZZ P XOE UK NQRZ OGJHZ DMU RYUHP HQJ H P HMRG RFLVNL WRFKQ NK](#)
[YRG](#)

5 H R O M R Q R I W H * R Y H Q P H Q V R I W H 5 X W D Q) H G U D M R Q R I 1 H G
R I 2 Q \$ S S U R Y D D R I W H 5 X O V R I & R G : D M U 6 X S S O D G G : D M U
' L S R V D O D G R Q \$ P H Q P H Q V R I & H U D Q \$ F W R I W H * R Y H Q P H Q V R I W H 5 X W D Q
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9 D D U I R * X L G R \$ Q V H L 0 D U F R ' H 6 D G F W ' D P L D R 6 J K H J D 6 I P R O D 3 H Q M X J O D
(P D Q X H D % D U F D & Q X G R ' L , D F R Q 7 U H D M Q D G G U H K L Q J Z D V N Z D M U H Q H U D M G E
W H Z D K L Q J R S H U D M R Q / L Q W H Q R Q K Q J D U R X V S O M M F V R O G Z D M U H F F O Q J S U R F H V
\$ G Y D F G P H M R G Y V F R Q H Q M R O D P H M R G - R X U D O R I (Q Y L R Q P H Q M O
0 D D J H P H Q M R O P H , 6 6 1

9 . * X S D , \$ Q 7 \$ 6 D O K \$ 1 D D N D G G 6 \$ J D Z D O & K P L F D O W H D V H Q V
WFKQRJLHV IRU Z DVNZ DMU UFA FOQJ DQ RYHYLZ 56 & \$ G Y
' 2 , & 5 \$ (

1 Q P X Q 1 D K U 0 G 6 Q J D G X O + D T X H 6 K P D (+ D T X H * U R X Q Z D M U
F R Q H Y D M R Q D G G U F A F O Q J D G G U H K V R I W H W D Z D V N Z D M U L Q D G - Q P L G G X W I R I
% D Q J D G H K : D M U 5 H R X U H V D G G , G G X W I

6 L L / L D Q < H ' X 4 L / L X - L D G N D Q / L = K L / L X < D Q ; X = K X R & K H Q < L Q + X
: X E D G G + R Q J < L Q J + X ; \$: D V N Z D M U U H K V H D G G U F A F O Q J R I W H W H O
L G G X W I L Q & K L Q D K L V R U F X U H Q W L M D M R Q D G G I X M U H S H U S F W H V : D M U 5 H K V H
9 R O 1 R G R L Z L G

- \ R A D D 0 D X U D 6 X F K M D \$ W H D \$ Q I D D \$ U K L 7 K H 7 U H D V H Q V R I : D V N Z D M U
5 H F F O Q J D G G 5 H K V H 3 D W 3 U H F W D G G L Q W H) X M U H , Q M L D M R O D - R X U D O R I
6 F L H Q H D G G 5 H M D U F K , - 6 5 , 6 6 1 6 -)

6 F D Q J X S Z D M U U H K V H Z K L V V I P S R U D Q V R U H K V H Z D V N Z D M U
[KWSV EQRJ VZ RUCEDQNRJ UX FOP DMFKQJH VFDQJ Z DMU UHVKH Z K UFA FOQJ R](#)
[XUZ DVNZ DMU P DNH VHQH](#)

) H R I D R Y < \$ 7 K H U R D I R I Q T X L G U H F L X D M R Q L Q W H R S H U D M R Q R I E L R O J L F D O
Z D V N Z D M U W F D V H Q V D F L Q M H V : D M U D G G (F R G J \ 3 U R E O P V D G G 6 R O M R Q /

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1 I N I R U R Y / / ' D E H Y , + 6 K D Q N 0 \$ 5 H F F O Q J R I Z D V N Z D M U L Q P H D V
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6DC8L1 6DQMV DCG HSLGPIRQJLFD UHTXUHP HQV IRU VMH
P DQMCQFH RI VMH VMUMLUHV RI XUEDQ DCG UXUDVHWP HQV IRUZ DMUJERGH/
GUICNLQJ Z DMU DCG GUICNLQJ Z DMU VSSO DAF RSKHUF DU VLOQ QYLOJ TXDUMV/
RSHUDNRQ RI LGGWINDODCG SXEUF SUP LVHV RJJQJ DNRQ DCG FRQGFWRV VQVQV
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9 3 0 HKDNLQ , \$ 3RFKWLQDQ < \$ %HWROBYD \$ 9 \$ UWP RQRY 0 HMRGRU\
RI RJJQJ DNRQ RI FQVHGZ DMUJURDNRQ RI HQNSULHV IRUSURGFWRQ RI () & DCG
PIQHDO IHUMJ HV 5RV FK-P M =K 5RV FK-P REVRY QDPHG DMU' ,
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